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Novice teen driving: GDL and beyond

James Hedlund *

Highway Safety North, USA

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Abstract

The Symposium on Novice Teen Driving: GDL and Beyond — Research Foundations for Policy and Practice, held in Tucson, AZ, on February 5–7, 2007, provided a detailed overview of graduated driver licensing (GDL) and other beginning driver issues in the United States. This paper summarizes the information presented at the Symposium and in its background papers. *Impact on Industry:* This information and summary should help all interested persons and organizations, including industry, in their efforts to improve GDL and teen driver programs in the United States, which in turn will further reduce traffic crashes and fatalities involving teenage drivers.

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Keywords: Graduated driver licensing; Novice drivers; Teenage drivers

1. Introduction

Interest in, knowledge about, and implementation of graduated driver licensing (GDL) in the United States has blossomed in the past decade. GDL is now widely accepted as the most effective way to introduce teenagers to driving. GDL was introduced New Zealand in 1987; Ontario and Nova Scotia followed in 1994. In 1996, Florida was the first state to implement a comprehensive system; now all states have at least some GDL components in place. The first GDL evaluations were completed in 2000; now more than 25 have been published. Research is helping to refine GDL by determining the effectiveness of specific components. Most importantly, traffic crashes and fatalities in the United States involving teenage drivers have dropped dramatically over this decade.

GDL is a system in which novice drivers can gain driving knowledge, skills, attitudes, and experience under conditions of minimal risk. It has three stages: a learner's permit that allows driving only while supervised by a fully licensed driver, an intermediate license that allows unsupervised driving under certain restrictions, and a full license. The details of these stages and the requirements for progressing

from stage to stage can become complicated; they vary substantially across the states. The Insurance Institute of Highway Safety (IIHS, 2007) summarizes GDL requirements in the United States and Mayhew, Simpson, and Singhal (2005) give a thorough discussion of Canadian requirements and best practices.

The Symposium on Novice Teen Driving: GDL and Beyond, held in Tucson, AZ, on February 5–7, 2007, brought together 120 traffic safety researchers and practitioners to review GDL's progress and assess its current status and needs. The Symposium built on the foundation of the 2002 GDL symposium, whose background papers and summary were published in the January 2003 special issue of the *Journal of Safety Research* (Vol. 34, No. 1). As an indication of the interest in GDL, the National Safety Council received more requests for that issue of the *Journal* than for any other.

This paper summarizes information presented and discussed at the symposium. It cites the symposium's background papers, published in this issue of *Journal of Safety Research*, which in turn provide more information and cite original sources. It also presents information from the symposium's PowerPoint presentations (available from the National Safety Council) and discussion. Additional information on GDL and teenage driver issues may be found in the 2002 symposium summary (Hedlund, Shults, & Compton, 2003) and in three subsequent research summaries

* Tel.: +1 607 273 5645.

E-mail address: jhedlund@sprynet.com.

(Hedlund & Compton, 2004, 2005; Hedlund, Shults, & Compton, 2006).

This concise summary necessarily omits much useful information and many points of discussion. Its views and judgments do not necessarily represent the views of any symposium participant or their organizations. In particular, they are not necessarily endorsed by the National Safety Council or by the symposium's sponsors: the GEICO Foundation, State Farm Insurance, Centers for Disease Control, National Highway Traffic Safety Administration, General Motors Corporation, and Nationwide Insurance.

2. Teenage driver crashes, 1995 and 2005

While teenage driver crashes and casualties decreased in the past decade, teens are still high risk drivers. Research is providing new insights into how teens drive and why they crash.

2.1. Teenage driver crashes dropped substantially from 1995 to 2005

Crashes involving teenage drivers in the United States have decreased substantially over the past decade, measured either by fatal crash counts (Table 1) or by crashes per population (Table 2). Table 2 shows that the reductions were greatest for drivers age 16 and 17, the ages affected by GDL. Both tables show that the reductions for 16 year old drivers were greater than for older teens. Table 1 shows greater reductions for crashes at night and for crashes involving passengers, suggesting that GDL nighttime and passenger restrictions may have had some effect.

2.2. Teenage drivers in 2005 are still substantially over-represented in crashes

While teens are safer drivers than they were 10 years ago, they still crash and die at high rates. In absolute numbers, 3,889 teens age 16–19 – more than 10 every day – died in passenger vehicles with a teenage driver in 2005. Per population, teenage drivers are involved in about twice as many crashes, both fatal and non-fatal, as drivers aged 30–59. Teenage drivers in fatal crashes were more likely to make driver errors, speed, or carry passengers than drivers age 26–49, though they were much less likely to have a positive blood alcohol concentration (Ferguson et al., 2007).

Table 1
Change in fatal crash involvements, 1993–95 to 2003–05

Driver age	Total fatal crashes	Night (10 pm – 4 am)	With passengers
16	–23%	–28%	–30%
17	–4%	–8%	–14%

Preusser and Tison (2007).

Table 2

Change in crash involvement per population, 1996 to 2005

Driver age	Fatal crashes per 100,000	Police-reported crashes per 10,000
16	–42%	–41%
17	–23%	–26%
18	–15%	–19%
19	–7%	–12%
30–59	–15%	–26%

Ferguson, Teoh, and McCart (2007).

2.3. Teenage driver errors typically involve poor judgment and decision-making

Research is beginning to provide more detailed information on how and why drivers crash. Virginia Tech recently completed a 100-car “naturalistic driving” study in the northern Virginia area (Dingus, 2007). Each driver's car, either their own or a leased car, was equipped with recording devices to measure the car's speed, acceleration, lane position, and the like, as well as video cameras that recorded the driver's face and torso, the road ahead, and the road behind. All driving for a full year was recorded as the drivers used these cars in their normal daily routines. A second similar study, currently in progress at Virginia Tech, is following 40 teen drivers for a year, starting within two weeks of the time they received their intermediate license — their first unsupervised driving. Each study contains events of several types: crashes of varying degrees of severity, near-crashes where sudden and severe action was required to avoid a crash, and incidents where less severe maneuvers were needed.

Teen driver events in both studies typically involved one or more of the following characteristics:

- willingness to accept risky behavior: using handheld electronic devices, impaired by fatigue or alcohol;
- failure to recognize hazards;
- judgment errors in assessing driving risks;
- poor decision-making under stress;
- late reactions after indecision.

In the 100-car study, teens made judgment errors four times more frequently than did older drivers. In both studies, 10% of the teen drivers were involved in over half of all teen driver events.

The consequences of these judgment and decision-making errors are exacerbated by poor vehicle control skills. Novice drivers still must concentrate on basic driving skills, so have less attention to devote to hazard recognition and unexpected demands. As drivers gain experience, many vehicle control skills become habitual “automated subroutines” that require little active concentration (Keating, 2007; Lee, 2007).

These results substantiate the foundation upon which GDL is based: that teen drivers need to acquire experience in both vehicle control skills and in judgment and decision-making on the road under conditions of minimal risk.

3. GDL in 2007

All states and most Canadian jurisdictions now have some GDL elements in place. Research in the United States and Canada has demonstrated conclusively that GDL reduces teenage driver crashes and fatalities. Three GDL elements clearly contribute to its effectiveness: an extended holding period for the learner's permit and nighttime and passenger restrictions during the intermediate license period. Other GDL components do not yet have sufficient evidence to demonstrate their effectiveness. The GDL system as a whole is based on sound principles of adolescent development and learning.

3.1. By 2006 all states had at least some GDL elements in place

In 1996, Florida introduced what is generally considered to be the first comprehensive GDL system in the United States (Preusser & Tison, 2007). By 2006, all states had some GDL elements in place. However, only 28 states had systems rated “good” by IIHS and no state had an optimal system (IIHS, 2007).

3.2. Evaluations demonstrate conclusively that GDL reduces teen driver crashes

Twenty evaluations of individual GDL systems in states and Canadian provinces and six multi-state studies have been published since the 2002 symposium. The studies vary in the data used, study designs, outcome measures, and whether they include all teen drivers or only specific ages. Despite these differences, almost all the studies reported “surprisingly consistent” positive results, usually crash reductions (Shope, 2007).

These studies, together with earlier studies, show conclusively that GDL reduces teen driver crashes. They cannot quantify the crash reduction precisely because jurisdictions differ both in their pre-GDL licensing requirements for novice teen drivers and in the components of their GDL systems. In general, crash reductions were greater for stronger GDL systems, as measured by the IIHS scale (Shope, 2007). Crash reductions also were generally larger than those produced by most traffic safety initiatives (Foss, 2007). The studies showed no increase in crash risk for 17 or 18 year old drivers. They showed similar crash reductions for both males and females.

3.3. Effective GDL components: extended learner's permit holding periods, nighttime restrictions, and passenger restrictions

3.3.1. Extended learner's permit holding periods

The first key GDL component is a requirement that the learner's permit be held for a minimum amount of time. Prior to GDL, most states had no required minimum learner's permit holding period; a few had short periods of 30 days or

less (Williams, 2007). By 2006, all but seven states required the learner's permit to be held for at least six months.

Longer learner's permit holding periods delay licensure (unless the minimum age for a learner's permit is reduced). This reduces driving and crashes, as several studies document (Williams, 2007). Preusser and Tison (2007) analyzed fatal crash rates in 2003–2005 for drivers aged 15–17 in states with different minimum learner's permit and intermediate license ages. As learner's permit and intermediate license ages decrease, fatal crash rates increase — even for drivers aged 17, who are eligible for a license in all states.

Longer learner's permit holding periods also provide more time for supervised driving. See Section 3.4.1 for additional discussion.

3.3.2. Nighttime driving restrictions

In 2006, all but six states restricted nighttime driving by teens with an intermediate license (Williams, 2007). The restricted hours varied considerably, starting as early as 6:00 pm and as late as 1:00 am. These restrictions are effective: evaluations in four states show substantially greater crash reductions in the restricted nighttime hours than in other hours when GDL was implemented.

3.3.3. Passenger restrictions

Teenage passengers increase crash risk, with each additional passenger adding to the risk (Ferguson et al., 2007; Williams, 2007). In 2006, 35 states and the District of Columbia restricted passengers in some manner, from no passengers to no more than three passengers, for some period of time. Several studies have found that passenger restrictions reduce crashes (Williams, 2007). However, fatal crash and survey data both confirm that compliance is lower for passenger restrictions than for nighttime restrictions.

3.4. GDL components that may be effective: supervised driving requirements, cell phone restrictions, seat belt use requirements, and contingent advancement

3.4.1. Supervised driving requirements

In 40 states and the District of Columbia, parents must certify that their teens had at least a minimum number of hours of supervised driving while they had a learner's permit — typically 40 to 50. Some states require some of these supervised driving hours to be at night. Supervised driving allows novice teens to gain driving experience in very safe circumstances. However, little information is available on how much supervised driving occurs under these requirements or on whether these requirements affect teen driver crashes (Foss, 2007; Williams, 2007).

3.4.2. Cell phones and other hand-held electronic devices

Thirteen states and the District of Columbia prohibit all cell phone use for some young drivers, either those with a learner's permit, an intermediate license, or all drivers under the age of 18 (GHSA, 2006). The effects of these laws have not been

evaluated (Williams, 2007). See Section 5.1 for additional discussion.

3.4.3. Seat belt use requirements

While teens are covered by seat belt use laws in all states (except New Hampshire, which only requires belt use by persons under age 18), they use their belts less frequently than older persons (Williams, 2007). GDL laws in 15 states require belt use (AAA, 2005), though these laws frequently are neither well understood nor enforced. For example, North Carolina's GDL law provides for a larger fine than the standard belt use law and delays full licensure for GDL drivers who are not belted. A study in North Carolina revealed that few teens and parents were aware of these provisions. A demonstration program to publicize and enforce the GDL belt use provisions had minimal effects, although belt use before the program was already high (Williams, 2007).

3.4.4. Contingent advancement

Most state GDL programs make advancement to the intermediate and full license contingent on having a clean driving record, with no crashes or violations, for a period of time (Williams, 2007). Little is known about the effects of this requirement, especially since, in almost all states, full licensure is available to all persons at age 18 regardless of their performance under GDL. See also Section 4.1 for discussion of Iowa's program that builds upon contingent advancement.

3.5. GDL is based on solid research on adolescent development and learning

Recent research in adolescent development confirms that GDL is based upon sound principles (Keating, 2007). Research on brain development has shown that the brain undergoes substantial changes beginning at age 11 or 12 and continuing well after age 20. This confirms the biological basis for some commonly-observed teen behaviors: eager to engage in many activities that bring immediate rewards, lacking a longer-horizon system of checks and balances, easily distracted, quite willing to take risks if their risk-taking behavior is reinforced. GDL addresses these issues. The learner's permit holding period provides time to acquire necessary driving expertise through guided practice. The intermediate license passenger restriction reduces distractions; a restriction on cell phones and other handheld electronic devices would reduce distractions even further. The overall GDL system encourages parents to guide and manage their teen's driving.

4. Other influences on novice teen drivers

A GDL system involves many partners. The license itself is issued and monitored by state Departments of Motor Vehicles (DMVs). Law enforcement officers have the formal

responsibility for enforcing its provisions. In practice, parents frequently serve as "keepers of the keys" who can monitor and manage their teen's driving. Driver education is not a substitute for GDL but may be an effective complement. Medical and public health professionals and organizations also may be able to complement and support GDL.

4.1. Motor Vehicle Departments

Each state's DMV establishes the state's driver licensing requirements, as authorized by the state's laws, and issues and monitors all licenses. In particular, state DMVs are responsible for administering the state's GDL system. DMV efforts range from conducting the required knowledge and driving skill tests and issuing licenses, to actively educating parents and teens about traffic safety and working with law enforcement to monitor novice teen drivers in all GDL stages.

Iowa provides an example of the safety benefits of active DMV management of teen drivers (Stutz, 2007). Any moving traffic violation or contributory crash by a teen with an intermediate license triggers a remedial interview with the DMV, at which both the teen driver and a parent must participate. The interview usually produces an informal driving improvement plan endorsed by the teen, the parent, and the DMV. The DMV also has wide discretion to apply any driving sanction it believes to be appropriate, ranging from no action to license suspension. In 2005, there were 20,725 teen driver incidents. Only 2% of the teens failed to appear for their remedial interview. The interviews produced informal plans for 76% of the teens and suspensions for another 20%. Crashes involving 16 year old drivers have decreased from 6,206 in 1998, the year before Iowa's GDL was enacted, to 3,904 in 2004, a drop of 37%.

4.2. Law enforcement

GDL requirements always will be difficult to enforce. Without stopping the vehicle, law enforcement officers cannot tell if an unsupervised teen driver is driving illegally with a learner's permit, or at night in violation of a nighttime restriction. But even minimal enforcement is impossible if officers cannot recognize a learner's permit or intermediate license and do not know their provisions. Omaha, NE, recognized this problem and incorporated GDL issues into the training received by all officer recruits. This increased GDL enforcement substantially (Scott, 2007).

4.3. Parents

Parents are partners with their teens as they learn to drive. Parents must endorse their teen's applications for a learner's permit, an intermediate license, and a full license. In many states, parents may request that these licenses be suspended or revoked. Parents are the usual supervisors for learner's permit drivers. In states with a supervised driving requirement,

parents must certify that the requirement has been met. And many teens learn to drive in a parents' car.

Many parents impose formal or informal restrictions on their teens' driving, especially during the initial months of unsupervised driving, such as a requirement that the parents know in advance where the teen is driving and when he or she will return, or limits on driving at night, with passengers, or in dangerous conditions. Several recent studies conclude that risky driving, traffic violations, and crashes are lower among teens whose parents set such limits (Simons-Morton, 2007).

Several new programs have been developed to help parents and novice teen drivers. They provide information for both parents and teens on driving risks. They include a teen-parent driving agreement through which teens and parents can agree in advance on their expectations and rules, how these rules will be enforced, and when they will be relaxed. One program, *Checkpoints*, has been evaluated in three experimental settings and has been shown to increase parental driving restrictions during the first year of licensure. In one setting, *Checkpoints* reduced teen risky driving and traffic violations (Simons-Morton, 2007). A second program to encourage teen-parent contracts, included as one component in a long-term program to provide healthier home environments for children, also increased the use of teen-parent contracts (Catalano, 2007). Other programs include *Driving Skills for Life*, developed by Ford and the Governors Highway Safety Association (GHSA), *Road Ready Teens*, developed by DaimlerChrysler and others, and *Teen Driver*, developed by the National Safety Council. These have not yet been evaluated (Hedlund et al., 2006).

4.4. Driver education

It is now widely understood that driver education – the standard model of 30 hours of classroom instruction and 6 hours on the road which enjoyed great popularity 40 years ago – does not produce safer teen drivers. In fact, driver education may decrease overall safety by enabling teens to become licensed earlier, thereby putting more drivers on the road at an earlier age (Mayhew, 2007).

Driver education does teach driving skills, and poor driving skills are an important contributor to teen driver crashes. In six hours on the road, driver education does not provide novice teen drivers enough time to practice these skills. A driver education time discount – a reduction in the holding period for a learner's permit or intermediate license, or a reduction in the required amount of supervised driving for driver education graduates – is not warranted because driver education does not substitute for driving experience (Mayhew, 2007).

Ideally, three components would work together to train novice teen drivers:

- driver education, to teach driving skills;
- parents, to provide supervised driving practice for these driving skills, to help novice teen drivers learn to make

appropriate decisions and judgments when driving, and to manage their teen's driving; and

- GDL, to provide the structure that sets overall limits and requirements, including an extended learner's permit holding period and intermediate license restrictions, and that encourages parents to supervise and manage their teen's driving.

Several potential improvements may help driver education play its role in this three-way partnership more effectively (Mayhew, 2007). They include:

- Adopt multi-stage driver education: the first stage to teach basic driving skills; the second, after some driving experience, to teach safe driving procedures and decision-making.
- Update course content to focus on teen driver risk factors;
- Use effective teaching methods based on sound learning principles, perhaps involving computer-based instruction or driving simulation;
- Match instruction to the skill levels and needs of individual teens.

Initiatives in Australia and Europe may provide valuable information on potential driver education improvements. Australia soon will evaluate an experimental second-stage driver education program in two states, New South Wales and Victoria (Senserrick, 2007). It will include four instruction sessions, the first at the time of licensing and the others after at least 60 days of driving experience, to improve safe driving decisions and behaviors. Several Australian states offer short pre-licensure programs for teens and parents to encourage at least 120 hours of supervised driving practice under a variety of driving conditions. Three European countries require second-stage post-license training for beginning drivers and several other countries provide this training as a voluntary option (Twisk, 2007).

4.5. Medical and public health

Medical and public health organizations and individuals have long been active in many traffic safety areas, including child safety and booster seats, adult seat belts, bicycle and motorcycle helmets, alcohol, and drugs, but GDL and other novice teen driver issues have not been a major priority. These organizations and individuals could and should be important and influential partners in many novice driver safety activities. As one example, the American Academy of Pediatrics (AAP) recently released a policy statement recommending that pediatricians counsel their teenage patients and parents on safe driving issues including GDL provisions, seat belt use, and cell phones; encourage teen-parent driving contracts; and advocate for strong GDL legislation (AAP, 2006).

In June 2006, CDC and the State and Territorial Injury Prevention Directors Association (STIPDA) sponsored a Prevention Roundtable meeting to help state public health

and traffic safety organizations work together on teen traffic safety. The Roundtable brought together teams from 12 states. Each state's team developed an action plan for collaborative strategies. Typical plan activities included GDL legislation, enforcement, education, and evaluation; teen seat belt, alcohol, and social norm programs; standardizing and improving driver education; parent programs; and strategies to establish or improve coalitions. State teams reported on their progress in a January 2007 web seminar (Greenspan, 2007).

5. Technology

Rapidly-evolving communication, entertainment, and vehicle sensor and control technology already is affecting drivers, and the pace of technological innovation is increasing. Some devices and systems can distract drivers while others can protect them. They probably will affect novice teen drivers more than older drivers. New technology can be thought of as “another passenger” in the teen driver's car: a distracting and dangerous rowdy teenager, a protective parent, or perhaps one of each (Lee, 2007).

5.1. Risks of new technology

Today's teens have grown up with a host of portable communication and entertainment devices that were unknown only a few years ago, including cell phones, iPods, DVD players, text messaging devices, and laptop computers. They take these electronic “infotainment” devices into their cars and use them frequently, where they present obvious distractions to the driver (Dingus, 2007; Lee, 2007). Cell phones have received the most attention. Thirteen states and the District of Columbia have prohibited their use for some young drivers (GHSA, 2006). Text messaging devices may be more distracting to drivers because they require the use of the driver's eyes and fingers for a longer time than is needed to dial a cell phone. New and increasingly complex “infotainment” devices will continue to be developed and marketed, and teens will be the first to use them. States cannot afford to wait until they produce crashes and fatalities. States should immediately consider incorporating portable “infotainment” restrictions into their GDL system or should follow the lead of Texas, which prohibits use of any “handheld communications device” by drivers under the age of 18. Driver education and parent-teen driving programs also should address the use of these devices.

5.2. Benefits of new technology

New in-vehicle technological systems can make driving safer by warning the driver of potentially dangerous situations, improving vehicle performance, or taking control of the vehicle when needed. Antilock brakes and electronic stability control systems are now standard on many new vehicles. Other advanced driver assistance systems (ADAS)

being developed or implemented include automatic collision warning, automatic speed monitoring, and GPS navigation (Lee, 2007). These can make driving safer for all drivers, not only teens, as long as drivers do not take advantage of them by paying less attention to their driving. Also, it will be many years before new in-vehicle systems are found in a large proportion of the vehicle fleet.

Still other technologies may help instruct or monitor novice drivers. In a pilot project, 25 novice teen drivers in rural Iowa drove cars equipped with audio and video recording equipment that recorded information from 10 seconds before to 10 seconds after any abrupt braking or steering event (McGehee, 2007). The system also recorded belt use. Teens and parents received a weekly report which compared their performance to their peers. After four weeks of these reports there was a substantial reduction in events due to “coachable” driving errors. A 40-teen follow-up study in urban Minneapolis will be conducted in 2007.

6. Next steps: research, evaluation, and implementation

The GDL components that are known to be effective should be implemented in all states. Evaluation should continue to further refine knowledge of these components and to investigate the effectiveness of other components. Fundamental research should investigate how teens drive, how they become involved in crashes, and how their crash rates can be reduced.

6.1. Implement effective GDL systems in all states

6.1.1. Agree on coordinated GDL education and advocacy

Many organizations have actively supported GDL in the past decade, but their efforts too frequently have been isolated and uncoordinated. Coordinated education and advocacy can be more efficient, as organizations share information and resources, and more effective, as all organizations present the same message.

6.1.2. Define and agree on the core elements of a good GDL system

Recent research, presented at this symposium and summarized in Section 3, provides solid evidence that a good GDL system should include an extended learner's permit holding period and intermediate license nighttime and passenger restrictions (Williams, 2007). Research does not yet answer many questions regarding the details of these components, such as how long a holding period and the hour at which nighttime restrictions should start. Research also has not yet evaluated the effectiveness of other components for which there is substantial support, such as supervised driving requirements and cell phone restrictions. Organizations supporting GDL should agree on the core components of a good GDL system and determine which states lack these core components. These organizations may even be able to agree on other components of an optimal GDL system. For example, a

core component may be a nighttime restriction while an optimal component may be a nighttime restriction beginning by 10:00 pm (as used in the current IIHS rating system: a nighttime restriction beginning by 10:00 rates two points while a restriction beginning at a later hour rates only one point). Restrictions on handheld electronic communication and entertainment devices should be considered either as part of a GDL system or for all young drivers (Dingus, 2007; Lee, 2007).

6.1.3. Provide effective GDL support materials

Some materials are already available, from the American Association of Motor Vehicle Administrators (AAMVA, 2007), AAP (2006), the Council of State Governments (CSG, 2006), IIHS (2007), and National Highway Traffic Safety Administration (NHTSA, 2004), among others. Materials are needed to inform legislators, policymakers, the media, and the public about GDL: describe the overall concept clearly, identify key components, provide research and evaluation evidence, and address common objections. The materials will be most effective if they present a consistent message.

6.2. Improve GDL system operations

GDL programs in some states may operate more effectively if they meet three goals.

- All teens and parents should understand all GDL system requirements and the consequences of violating these requirements.
- Law enforcement officers should understand and enforce all GDL requirements (Scott, 2007).
- DMVs should educate teens and parents about GDL, actively monitor GDL licensees, and take appropriate action for violations (Stutz, 2007).

6.3. Evaluate the effectiveness of individual GDL components and GDL implementation practices

Continued research is needed in three areas. Several different organizations currently fund and manage young driver research. Close coordination among these organizations can allow research funds to be allocated more effectively and can allow new projects to build on recent and ongoing work.

- Evaluate components whose effectiveness has not yet been demonstrated, such as cell phone restrictions, supervised driving requirements, and contingent advancement (Williams, 2007).
- Evaluate the optimal structure for the core components, such as the starting time for nighttime driving restrictions and the length of the learner's permit holding period (Williams, 2007).
- Evaluate the effect of active GDL enforcement by law enforcement officers and DMVs (Scott, 2007).

6.4. Continue research, demonstration, and evaluation activities to improve GDL

Again, coordination among participating organizations would be useful. Researchers should communicate their findings regularly and clearly to the traffic safety community so that up-to-date research results can be incorporated into teen driver safety programs.

- Help parents instruct, guide, and manage their novice teen's driving and integrate parents into GDL programs (Catalano, 2007; Simons-Morton, 2007).
- Improve driver education and integrate driver education into GDL programs (Mayhew, 2007; Senserrick, 2007; Twisk, 2007).

6.5. Continue fundamental research on teens and teen drivers

Coordination is all the more important since research in these areas can be very expensive.

- Accurate data on teen driver licensure and miles of travel (Ferguson et al., 2007; Foss, 2007).
- Research on using new technology to instruct or monitor novice drivers (McGehee, 2007).
- Basic research on teen driving, driving errors, and crash causes (Dingus, 2007; Foss, 2007).
- Basic research on adolescent development and on the implications of this research for novice teen drivers (Keating, 2007).

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References

- AAA (2005). *GDL laws*. Heathrow, FL: AAA Public Affairs.
- American Association of Motor Vehicle Administrators [AAMVA] (2007). *Graduated driver licensing*. Arlington, VA: Author. www.aamva.org/KnowledgeCenter/Driver/At-Risk/GDL.htm
- AAP (2006). The teen driver. *Pediatrics*, 118(6), 2570–2581 (pediatrics.aappublications.org/cgi/content/full/118/6/2570).
- Catalano, R. F. (2007, February). Steering toward safety: Promoting healthy driving behavior through developmental prevention. *Novice teen driving: GDL and beyond — Research foundations for policy and practice. Symposium conducted in Tucson, AZ*.
- Council of State Governments [CSG] (2006). *Graduated driver licensing tool kit*. Lexington, KY: Council of State Governments. www.healthystates.csg.org/Publications/
- Dingus, T. A. (2007, February). A dose of reality: Videos of teen driving behavior. *Novice teen driving: GDL and beyond — Research foundations for policy and practice. Symposium conducted in Tucson, AZ*.
- Ferguson, S. A., Teoh, E. R., & McCart, A. T. (2007). Progress in teenage crash risk during the last decade. *Journal of Safety Research*, 38(2).
- Foss, R. (2007). Improving graduated driver licensing systems: Implement principles rather than laws. *Journal of Safety Research*, 38(2).

- Governors Highway Safety Association [GHSA] (2006). *Graduated licensing laws*. Washington, DC: Author. www.statehighwaysafety.org/html/stateinfo/laws/license_laws.html
- Greenspan, A. (2007, February). Building state partnerships. *Novice teen driving: GDL and beyond — Research foundations for policy and practice*. Symposium conducted in Tucson, AZ.
- Hedlund, J., & Compton, R. (2004). Graduated driver licensing research in 2003 and beyond. *Journal of Safety Research*, 35(1), 5–11.
- Hedlund, J., & Compton, R. (2005). Graduated driver licensing research in 2004 and 2005. *Journal of Safety Research*, 36(2), 109–119.
- Hedlund, J., Shults, R. A., & Compton, R. (2003). What we know, what we don't know, and what we need to know about graduated driver licensing. *Journal of Safety Research*, 34(1), 107–115.
- Hedlund, J., Shults, R. A., & Compton, R. (2006). Graduated driver licensing and teenage driver research in 2006. *Journal of Safety Research*, 37(2), 107–121.
- Insurance Institute for Highway Safety [IIHS] (2007). *Licensing systems for young drivers*. Arlington, VA: Author. www.iihs.org/laws/state_laws/pdf/us_licensing_systems.pdf
- Keating, D. (2007). Understanding adolescent development: Implications for driving safety. *Journal of Safety Research*, 38(2).
- Lee, J. D. (2007). Technology and teen drivers. *Journal of Safety Research*, 38(2).
- Mayhew, D. R. (2007). Driver education and graduated licensing in North America: Past, present, and future. *Journal of Safety Research*, 38(2).
- Mayhew, D. R., Simpson, H. M., & Singhal, D. (2005). *Best practices for graduated driver licensing in Canada*. Ottawa, ON: Traffic Injury Research Foundation. www.trafficinjuryresearch.com/publications/pub_details.cfm?intPubID=204
- McGehee, D. V. (2007, February). An in-context video feedback intervention pilot on novice drivers: Implications for GDL. *Novice teen driving: GDL and beyond — Research foundations for policy and practice*. Symposium conducted in Tucson, AZ.
- National Highway Traffic Safety Administration [NHTSA] (2004). *Graduated Driver Licensing System. Traffic safety facts: Laws*. Washington, DC: Author. www.nhtsa.dot.gov/people/injury/new-fact-sheet03/Graduated-Driver.pdf
- Preusser, D. F., & Tison, J. (2007). GDL then and now. *Journal of Safety Research*, 38(2).
- Scott, L. (2007, February). Project night life: Drive to survive. *Novice teen driving: GDL and beyond — Research foundations for policy and practice*. Symposium conducted in Tucson, AZ.
- Senserrick, T. M. (2007). Recent developments in young driver education and training in Australia. *Journal of Safety Research*, 38(2).
- Shope, J. T. (2007). Graduated driver licensing: Review of evaluation results since 2002. *Journal of Safety Research*, 38(2).
- Simons-Morton, B. (2007). Why parent involvement in novice teen driving safety is essential and evidence of its effectiveness. *Journal of Safety Research*, 38(2).
- Stutz, D. (2007, February). Graduated driver licensing in Iowa. *Novice teen driving: GDL and beyond — Research foundations for policy and practice*. Symposium conducted in Tucson, AZ.
- Twisk, D. A. M. (2007). Trends in risk of young drivers and countermeasures in European countries. *Journal of Safety Research*, 38(2).
- Williams, A. F. (2007). Contribution of the components of graduated licensing to crash reductions. *Journal of Safety Research*, 38(2).

James Hedlund is Principal, Highway Safety North, Ithaca NY, following 22 years at the National Highway Traffic Safety Administration. He received his BA from Cornell University and PhD in mathematics from the University of Michigan. He has published over 60 research studies, conference summaries, research syntheses, and guides for traffic safety practitioners on a variety of behavioral traffic safety subjects.